

PATENT SPECIFICATION

335,163

Application Date: June 14, 1929. No. 18,308/29.

Complete Left: March 3, 1930

Complete Accepted: Sept. 15, 1930.

PROVISIONAL SPECIFICATION.



Improved Method of Charging Powders into Furnaces and other Reaction Chambers.

We, FRANCIS BRIAN GRANT, a British Subject, of Norton Hall, The Green, Norton-on-Tees, County Durham, and IMPERIAL CHEMICAL INDUSTRIES LIMITED, a British Company, of Imperial Chemical House, Millbank, London, S.W. 1. do hereby declare the nature of this invention to be as follows:—

This invention relates to an improved method and apparatus for feeding powders into vessels such as furnaces or reaction vessels.

According to the invention the powder is charged into a vessel through a screen which is vibrated for the purpose of shaking the powder through the screen into the vessel below. The screen is of such a texture that it will support a bulk of powder without allowing it to pass through unless it is vibrated and one feature of the invention consists in the correlation between size of particle and mesh of screen to achieve this end.

The invention also includes an apparatus comprising a hopper, having at its base a screen, placed above a vessel and means whereby either the hopper and screen or the screen alone can be vibrated for the purpose above mentioned.

The invention is best understood with reference to the accompanying drawings showing two modifications of the apparatus.

Powder is introduced into the hopper 1, and falls upon the screen 2 supported by a rigid hinged frame 3. The frame 3 is hinged at 4. and at the opposite end 5 a mechanism is provided to effect vibration. This may take the form of a pneumatic vibrator as shown in Figure 1 where 6 is the vibrator and 7 a rigid support or as in figure 2 of a cam 8 and spring 9. The hopper 1 may be directly attached to the frame 3 as in Figure 1; or an intervening bellows joint 10 may be fitted (Figure 2). In the latter case the screen only is vibrated, the hopper remaining stationary. A bellows joint 11 forms the connection between the frame 3 and the reaction vessel 12.

The powdered material before being charged into the hopper is screened to eliminate particles of a size greater than the mesh of the sieve at the base of the hopper. For example, if a 100 mesh sieve is used for feeding the powder from the hopper, the material should first be sifted through a 120-mesh sieve. The rate at which the powder material is fed into the vessel may be varied within limits by varying the rate of vibration of the screen.

Dated this 12th day of June, 1929.

W. P. THOMPSON & Co.,
12, Church Street, Liverpool,
Chartered & Registered Patent Agents.

COMPLETE SPECIFICATION.

Improved Method of Charging Powders into Furnaces and other Reaction Chambers.

We, FRANCIS BRIAN GRANT, a British Subject, of Norton Hall, The Green, Norton-on-Tees, County Durham, and IMPERIAL CHEMICAL INDUSTRIES LIMITED, a British Company, of Imperial Chemical House, Millbank, London, S.W. 1. do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an improved
[Price 1/-]

method and apparatus for feeding powders into vessels such as furnaces or reaction vessels.

It has previously been proposed to provide a horizontal sieve or grating, rocking or oscillating on a vertical axis to feed pulverised fuel into a furnace, and it has also been proposed to vibrate a rigidly stretched screen arranged beneath a coal dust container by means of a beating device.

According to the invention the powder

Price 4s 6d

is charged into a vessel through a screen which is caused very rapidly and uniformly to vibrate in a vertical direction through a small amplitude for the purpose of shaking the powder through the screen into the vessel below. The screen is of such a texture that it will support a bulk of powder without allowing it to pass through unless it is vibrated and one feature of the invention consists in the correlation between size of particle and mesh of screen to achieve this end.

The invention also includes an apparatus comprising a hopper, having at its base a screen, placed above a vessel and means whereby either the hopper and screen or the screen alone can be vibrated uniformly in a vertical direction for the purpose above mentioned.

The invention is best understood with reference to the accompanying drawings in which Figs. 1 and 2 show two modifications of the apparatus according to the invention while Fig. 3 shows in detail one form of vibrating mechanism.

Powder is introduced into the hopper 1, and falls upon the screen 2 supported by a rigid hinged frame 3. The frame 3 is hinged at 4 and at the opposite end 5 a mechanism is provided to effect vibration. This may take the form of a pneumatic vibrator as shown in Figure 1 where 6 is the vibrator and 7 a rigid support or as in Figure 2 of a cam 8 and spring 9. The hopper 1 may be directly attached to the frame 3 as in Figure 1, or an intervening bellows joint 10 may be fitted (Figure 2). In the latter case the screen only is vibrated, the hopper remaining stationary. A bellows joint 11 forms the connection between the frame 3 and the reaction vessel 12.

By the use of a pneumatic vibrator exceedingly rapid rates of vibration e.g. over 750 per minute are attained.

A suitable form of pneumatic vibrator, such as that mentioned in connection with the apparatus in Fig. 1, is shown in Fig. 3.

A piston 13, having ducts 14 and 15, is free to move in the cylinder 16. The cylinder has two inlets for compressed air, 17 and 18, communicating with the main supply pipe 19 and two outlet pipes, 20 and 21, communicating with a common exhaust pipe 22. The construction is so arranged that when, for example, the pipe 17 is in communication with the cylinder through the duct 14, the openings of the inlet pipe 18 and outlet pipe 20 are closed and outlet pipe 21 is open. The air entering the cylinder through pipe 17 and duct 14, forces the piston forward, and the air on the other face of the piston out through the exhaust

21. This proceeds until pipe 17 becomes closed and duct 15 takes up a position opposite the inlet pipe 18, the outlet pipe 20 being open and 21 closed. The reverse action then takes place. The frequency of vibration may be varied by alteration of the stroke of the piston.

The powdered material before being charged into the hopper is screened to eliminate particles of a size greater than the mesh of the sieve at the base of the hopper. The difference between the size of mesh of the preliminary screen for charging the material into the hopper and the screen for feeding the material from the hopper depends on the material to be fed. For example, when it is required to feed powdered lignite into a vessel and a 20 mesh sieve is used for feeding the powder from the hopper, the material should first be sifted through a 120 mesh sieve. When dry, pulverised bituminous coal is to be fed into a reaction vessel, the material should be subjected to a preliminary sifting through a 120 mesh sieve a 100 mesh sieve being used for feeding the powder from the hopper. The rate at which the powdered material is fed into the vessel may be varied within limits by varying the rate of vibration of the screen.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method for feeding powdered material into vessels which consists in causing a screen or sieve on which the powder is heaped, to vibrate uniformly and very rapidly with small amplitude in a vertical direction and shake the powdered material through its meshes into the vessel.

2. A method as claimed in claim 1 in which the vibration of the screen is caused by pneumatic means.

3. A method as claimed in claim 1 in which the vibration of the screen is caused by mechanical means.

4. A method as claimed in any of the preceding claims, in which the material is first sifted through a screen with a closer mesh than the vibrating screen.

5. A method as claimed in any of the preceding claims for feeding finely divided coal into furnaces.

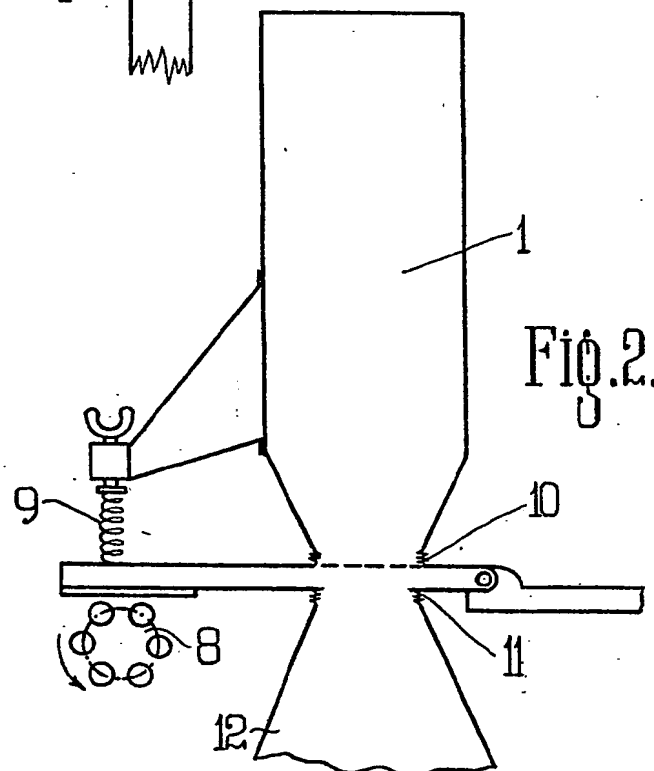
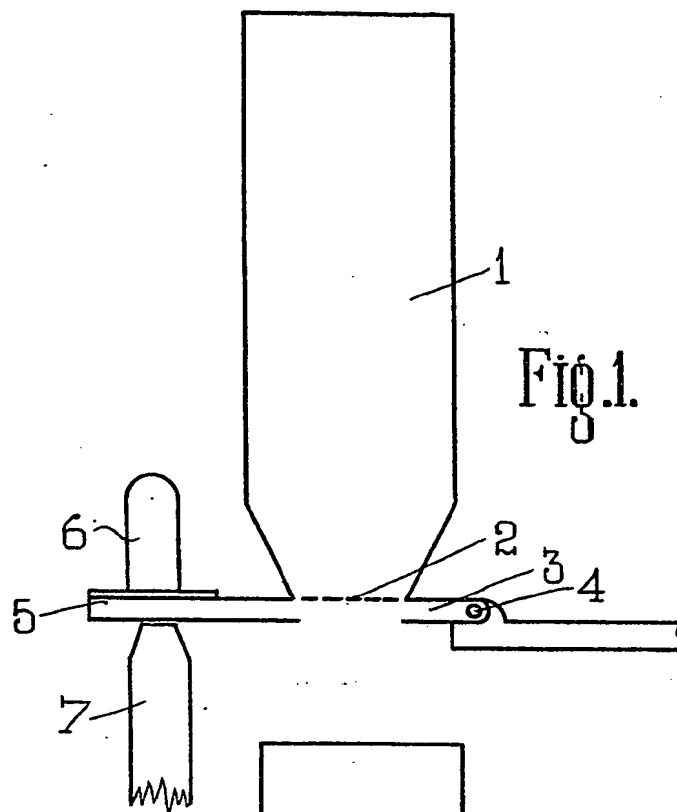
6. Apparatus for feeding powdered material into vessels, comprising a hopper, having at its base a screen, placed above the vessel and means whereby the screen and hopper, or the screen alone may be vibrated uniformly in a vertical direction at a high speed through a small amplitude.

7. Apparatus as claimed in claim 6, in

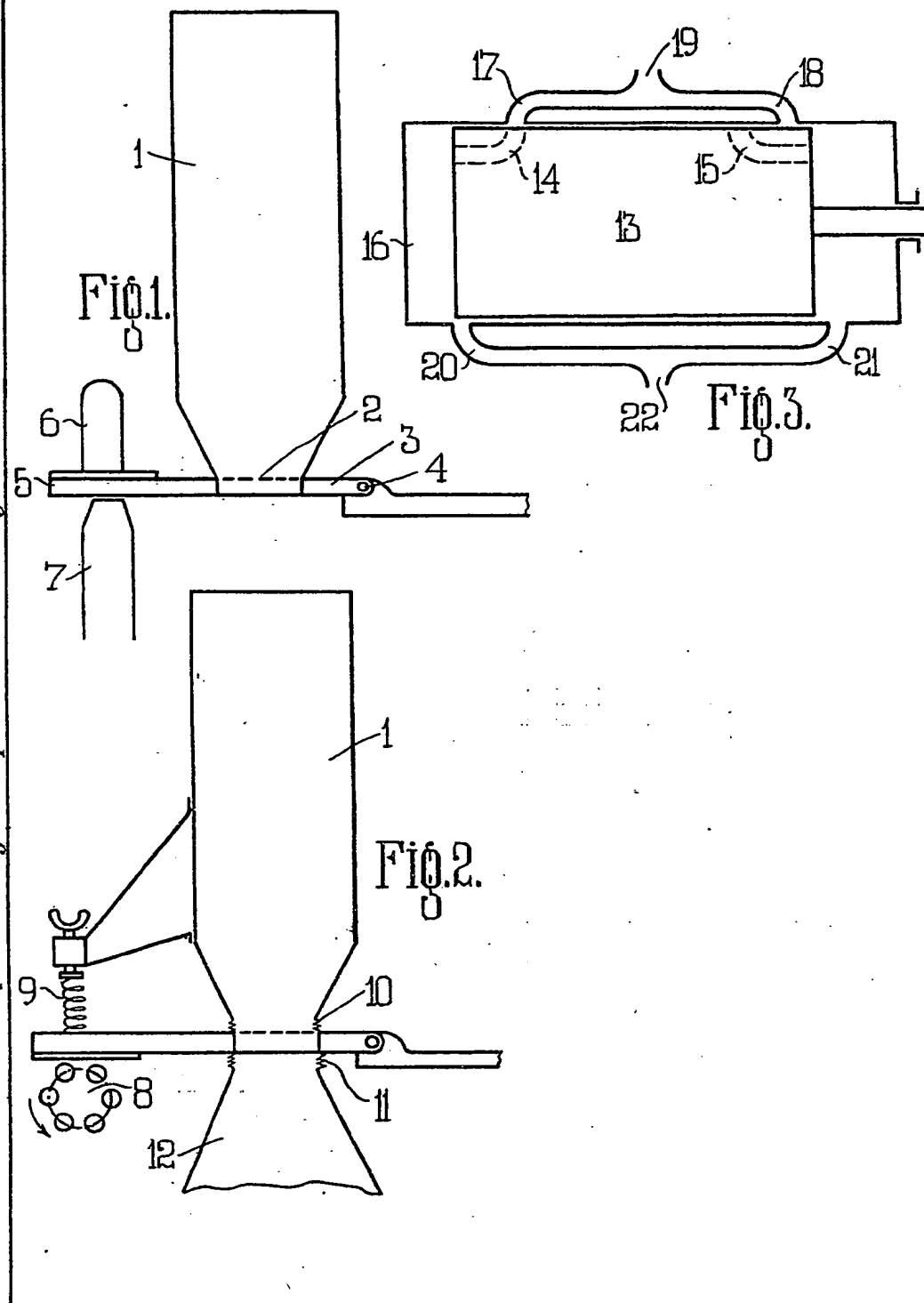
- which when the screen alone is vibrated, a flexible joint is provided between the screen and hopper, or the screen and hopper and screen and vessels.
- 5 8. A method for charging powdered material into vessels substantially as described.
9. Apparatus for charging powdered material into vessels constructed and arranged to operate substantially as described with reference to the accompanying drawing. 10
- Dated this 1st day of March, 1930.
W. P. THOMPSON & Co.,
12, Church Street, Liverpool,
Chartered & Registered Patent Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1930.

[This Drawing is a reproduction of the Original on a reduced scale.]



[This Drawing is a reproduction of the Original on a reduced scale.]



THIS PAGE BLANK (USPTO)